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FISH & WILDLIFE SERVICE

SOUTHWEST FISHERIES CENTER

MONTHLY REPORT - NOVEMBER 1979

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LA JOLLA, CALIFORNIA

HONOLULU LABORATORY
LA JOLLA LABORATORY
TIBURON LABORATORY
PACIFIC ENVIRONMENTAL GROUP

MONTHLY REPORT - NOVMBER 1979

STATUS OF PUBLICATIONS

Published

Yoshida, Howard O. 1979. Synopsis of biological data on tunas of the genus Euthynnus. NOAA Tech. Rep. NMFS Circ. 420, 57 p.

Biological and fisheries data on Euthynnus affinis, E. allettertus, and E. lineatus from published and unpublished sources were compiled, synthesized, and summarized following the FAO species synopsis outline.

Yuen, Heeny, S.H. 1979. A night handline fishery for tunas in Hawaii. Mar. Fish. Rev. 41(8):7-14.

Night handline fishing effectively catches tunas in localized areas. The fishery for tunas by this method in Hilo, Hawaii, experienced a rapid growth when high prices on the fresh tuna market and fast air delivery to distant cities made new markets for the catch available. The simplicity of the method and low cost of equipment makes it a promising method for island cultures of low technology to use for developing a fishery. The paper describes the fishing method and gear in detail.

Approved by Center Director

Domning, Daryl P. and Albert C. Myrick, Jr. Tetracycline marking and the possible layering rate of bone in an Amazonian manatee (Trichechus inunguis). For publication in IWC Aging Conference Symposium Papers.

THIS REPORT DOES NOT CONSTITUTE PUBLICATION AND IS FOR INFORMATION ONLY.

Hunter, John R. and Carol A. Kimbrell. Egg cannibalism in the northern anchovy, Engraulis mordax. For publication in the Fishery Bulletin, U.S.

Kimura, Makoto. Variability in techniques of counting dentinal growth layer groups in a tooth of a known-age dolphin, Tursiops truncatus. For publication in the IWC Aging Conference Symposium Papers.

Mendelssohn, Roy. Using Box-Jenkins model to forecast fishery dynamics I: Identification, estimation and checking. For publication in Fishery Bulletin, U.S.

Smith, Paul E. Ecological methods with particular reference to the study of insect populations. Ecology (Book Review).

Weihs, D. and H.G. Moser. Stalked eyes as an adaptation towards more efficient foraging in marine fish larvae. For publication in the Bulletin of Marine Science.

Administrative Reports

La Jolla Laboratory

Coan, A.L. Production model analyses for Atlantic yellowfin tuna (Thunnus albacares) 1964 to 1978: How are the conclusions affected by current CPUE estimates? SWFC Adm. Report No. LJ-79-34.

Rinaldo, R.G. Western Atlantic skipjack tuna (Katsuwonus pelamis): evaluation of available fishery and biological data. SWFC Adm. Report No. LJ-79-35.

Bartoo, N.W. Further analysis on spawner/recruit relationships for North Atlantic albacore. SWFC Adm. Report No. LJ-79-36.

Coan, A., N. Bartoo and S. Moore. An evaluation of the adequacy of available length-frequency an catch-effort data for determining the effectiveness of alternative management actions designed to raise the yield-per-recruit of yellowfin tuna in the eastern tropical Atlantic. SWFC Adm. Report No. LJ-79-37.

Evans, R., D. McLain and R. Bauer. Atlantic skipjack tuna: Influences of the environment on their vulnerability to surface gear. SWFC Adm. Report No. LJ-79-38.

Weber, E. An analysis of Atlantic bigeye tuna (Thunnus obesus) growth. SWFC Adm. Report No. LJ-79-39.

Staff, SWFC & SEFC. Review of United States fisheries and research activities on tunas and tuna-like fishes of the Atlantic Ocean for 1978-1979. SWFC Adm. Report No. LJ-79-40.

Smith, T. (ed.) Report of the status of porpoise stocks workshop (August 27-31, 1979, La Jolla, California). SWFC Adm. Report No. LJ-79-41.

Au, D., W. Perryman and W. Perrin. Dolphin distribution and the relationship to environmental features in the eastern tropical Pacific. SWFC Adm. Report No. LJ-79-43.

Rinaldo, R. Tuna conference proceedings - May 1979. SWFC Adm. Report. No. LJ-79-44.

Ahlstrom, E., R. Charter, et al. Northern anchovy staged eggs and larvae from quantitative vertical net tows - 1979: I. Data report. SWFC Adm. Report No. LJ-79-45.

HONOLULU LABORATORY

RESOURCE ASSESSMENT AND DEVELOPMENT INVESTIGATIONS (RADI)

Soviet Papers on Iteratively Aggregated Processes Translated

Dr. Roy Mendelssohn, Operations Research Analyst, reported that translations of four Soviet articles on iteratively aggregated processes were recently completed. Iterative aggregation is a solution technique originally developed in the U.S.S.R. for the solution of large-scale economic planning models--models that may include hundreds of thousands of variables. The technique involves the iterative solution of one master problem and a series of subproblems, each of which are smaller than the original problem.

Though developed for large-scale economic planning models, the papers deal with the mathematical problem of solving large-scale systems of equations or large-scale programming problems using techniques of iterative aggregation. Mendelssohn has been studing methods to approximate large-scale problems. The relevance of these methods to fishery research is reflected in the recent trend in the use of models that include age structure, trophic relationships, and random environmental variables. Such models usually have an exceptionally large number of variables; policy analysis can be performed only by guessing at a few policies that might be good, and comparing the model's evaluation of these policies. However, what would be more desirable is to be able to perform a "policy improvement" step: that is, given an initial guess at a good policy, to have an algorithm that will produce a new policy that has a greater return when evaluated by the model. Iterative aggregation techniques are a significant development in the effort to obtain such an algorithm. Such work underscores the need to continue basic long-range research into improved techniques for analysis of fishery problems, to go hand in hand with the applied research of developing specific management policies for a given fishery.

Market Study of Wahoo Continues

Gary Kamer, Biological Statistician, continued the determination of catch and demand curves for wahoo, Acanthocybium solanderi, caught statewide. The explanatory variables for catch are season and quantity of various target species. The model assumes a perfectly inelastic supply curve with the above explanatory variables acting as supply shifters. The explanatory variables for the demand curve include income, population, quantity of wahoo sold, and the prices of fish substitutes.

Experiments to Validate Growth Increments Started

James Uchiyama, Fishery Biologist, reported that he purchased live fish specimens from a commercial fisherman for experiments to validate daily growth increments in otoliths. The specimens included five pink snappers, Pristiopomoides filamentosus, one Brigham's snapper, P. zonatus, and one red snapper, Etelis marshi. Of these seven specimens, two pink snappers are still alive and have started to feed. Uchiyama indicated that tetracycline will be injected into these fish to mark the otoliths as soon as they are feeding satisfactorily. The experiment is vital in determining whether growth increments seen on the otoliths are laid down daily.

Uchiyama and Research Assistant Robert Moffitt conducted preliminary tests on dosages by injecting six goatfish, Parupeneus pelurostigma, with tetracycline but of these, only one fish survived. Further testing will be necessary before an attempt can be made on the pink snappers.

Otolith reading activities were also continued on samples from other species of fish. Research Assistants Joe Enitan and Jeffrey Sampaga began reading otoliths collected from kawakawa, Euthynnus affinis, caught in waters of the Northwestern Hawaiian Islands (NWHI).

Manuscript on Hawaiian Fisheries Under Preparation

Richard Uchida, Leader, Insular Resources Task, and Research Assistant Paul Shiota worked on the first draft of a paper dealing with current trends in Hawaiian fisheries. The purposes of the paper, which is slated to be submitted to Marine Fisheries Review for publication, are to document the historical catches of the various fisheries in Hawaii, to examine the trends in catches of the various species over the past few years, and to discuss the potential for fishery development in Hawaiian waters.

Revision of Skipjack Tuna Respiration Manuscript Completed

Revision of a manuscript "Respiration rates and low oxygen tolerance limits in skipjack tuna" was completed by Reginald Gooding, Fishery Biologist, and upon retyping will be ready for the Center Director's approval. Dr. Andrew Dizon contributed a section to the MS which describes the theoretical energy consumption of skipjack tuna, based on estimates of drag force. The theoretical approach and extrapolation of the experimental data correspond well. Dr. Dizon will be a coauthor of the paper, together with Gooding and Dr. William Neill of Texas A&M.

Over 800 Tissue Samples Tested to Date in Ciguatera Study

Research Assistant Bernard Ito continued routine sampling of tissues from kahala, Seriola dumerilii, caught and landed by the commercial handline fishing vessels. Since April 17 when sampling was first started, Ito has collected muscle tissues from 816 fish, 707 stomachs, and 673 gonads. The radio immunological assay conducted at the Pathology Laboratory of the University of Hawaii's John A. Burns School of Medicine, by Research Assistants Brian Joyo and Christine Siu, indicated that of the 816 fish sampled, 106 fish or 13% had levels of ciguatoxin sufficiently high to constitute a hazard to human health.

Contract Awarded Expert on Reef Fishes

Uchida reported that a contract has been awarded to Dr. John Munro, Dean of the Faculty of Science, University of Papua New Guinea, for a 4-week consultantship with the Honolulu Laboratory from mid-December 1979 to mid-January 1980. Munro, who has done extensive research on the biology, ecology, exploitation, and management of reef fishes, will interact with staff members at the Laboratory on specific research problems dealing with assessment of harvestable components of the NWHI fish communities, and will present two or more seminars on topics such as multispecies stock assessment, coral-reef fishery problems, fish trap designs, and fishery development problems among island governments in the central and western Pacific.

Japanese Fishery Training Ship Calls at Honolulu

On November 6 the Japanese training vessel, Kōyō Maru, which is operated by the Shimonoseki University of Fisheries, arrived in Honolulu for a refueling and rest stop en route to Brazilian waters to conduct shrimp surveys. Uchida, Uchiyama, and Ito met with Drs. Hayashi and Yamamoto, two members of the faculty who are serving as field investigators and instructors. According to Hayashi, the 40 students aboard are undergoing training in fishery biology, navigation, fishing gear operation, and marine engineering. The Koyo Maru departed Honolulu on November 9 and is scheduled to return here in February 1980 en route home to Japan from Brazil.

* * * * * * * * * *

Dr. Jeffrey Polovina, Statistician, assisted by Robert Moffitt, continued work on multivariate analysis of bottom fish catch data collected by the Hawaiian Division of Fish and Game, and on the bulk biomass ecosystem model of the NWHI.

* * * * * * * * * *

Shiota, who will be Chief Scientist on Townsend Cromwell cruise TC 79-05, assisted by Research Assistants Robert Humphreys, Darryl Tagami, Bert Kikkawa, Linda Hubbell, Victor Honda, and Robert Moffitt fabricated bottom longline gear and fish and shrimp traps in preparation for the cruise.

* * * * * * * * * *

Thomas Hida, Fishery Biologist, continued identification of material from the spew of seabirds. Hida is now being assisted by Research Assistant Mike Seki, a Young Adult Conservation Corps enrollee, hired by the U.S. Fish and Wildlife Service.

Hida also reviewed a manuscript for Sea Grant, University of Hawaii, entitled "Acute toxicity and observations on the toxic effects of four herbicides against the top minnow, Poecilia vittata," by William Albrecht.

Hawaiian Skipjack Tuna Landings Continue Below Long-Term Average

The November 1979 Hawaii landings of skipjack tuna were estimated at 19 metric tons (MT), which is 217 MT below the November 1978 landings and 150 MT below the 1948-78 long-term average for November. The cumulative landings from January through November were estimated at 2,607 MT, which is 323 MT below the 1978 landings for the same period and 1,540 MT below the 1948-78 long-term average for the same period.

FISH-ENVIRONMENT INVESTIGATIONS (FEI)

Balanced Nutritional Diet for Tunas Sought

Research Assistants Laura Duffy, Sharon Hendrix, and Martina Queenth were successful in attempts in inducing long-established kawakawa, Euthynnus affinis, (that had been habituated to a diet of smelt and squid) to accept a gel-base diet. Unlike the long-established kawakawa, a group of newlyacquired small kawakawa readily accepted a gel-base diet composed of gelatin, fish meal, and vitamin B supplement. After a week of unsuccessful attempts to convert large, long-established kawakawa to the new diet, four small kawakawa were transferred into the tank with the larger fish. The established kawakawa accepted the gel-base diet after 2 weeks. Four small kawakawa were also transferred into a control tank with established kawakawa and readily switched to the smelt and squid diet. Both tanks are presently being monitored to establish a balanced nutritional diet plan.

North Pacific Albacore Tracking Data Processed

Dr. Andrew Dizon, Leader, Experimental Ecology of Tunas Task, and Lt. H. A. Jemison of the NOAA Corps, completed preliminary processing of North Pacific albacore tracking data collected off the west coast in July and August of this year. The data were reduced and recorded on cassette tapes for analysis on a HP 9825A computer and a HP 9872 graphics plotter. Initial comparisons of horizontal versus vertical movement, depth versus time, latitude-longitude plots of each fish track and day-night vertical activity have been completed.

* * * * * * * * * *

Hendrix spent a week at the SWFC, La Jolla working with culturist Eric Lynn to observe techniques for establishing and maintaining mass food cultures. Hendrix plans to establish mass cultures of green algae, rotifers, and copepods by the summer of 1980 to feed tuna larvae.

* * * * * * * * * *

Heeny Yuen, Leader, Recreational Fisheries Task, worked on the development of analytical procedures to study movements of striped marlin, Tetrapturus audax, based on Japanese longline catch data. Yuen also served as Acting Administrative Officer during part of the month and also worked with Shiota and Ito on plans for the midlife refurbishment of the Townsend Cromwell.

LA JOLLA LABORATORY

Coastal Fisheries Resources Division

ALBACORE FISHERIES PROGRAM

Albacore-Oceanography Survey Cruise Completed on Jordan. Use of Vertical Longline Gear Attempted

With Oceanographer Ron Lynn as the cruise leader, the NOAA research vessel, David Starr Jordan, returned to San Diego on November 29 after completion of a 29-day albacore oceanography survey. During this cruise vertical longline gear, recently developed in Japan, was first used in a fisheries research program in the eastern North Pacific.

Numerous problems were encountered with the gear, in part due to the severe weather conditions. Lynn cancelled further fishing effort after five sets were attempted. Five fish were caught, one of which was an albacore.

An objective of this cruise had been to locate and map the subtropic front and test for the presence of albacore, especially in regions about the front where the subsurface thermal structure appears to favor their presence. Vertical longline gear was selected in order to reach the deep temperature layer preferred by albacore (albacore are not found in the surface waters which are above 20° C at this time of year). This objective was established as a test of the hypothesis that the albacore taken in the U.S. west coast fishery south of 38° N follow a separate migration pattern than those in regions to the north of 38° N. Further, the theory has it that the albacore may winter in a zone in and about the subtropic front (near 32° N) in the central and eastern Pacific. In part this hypothesis is based on the finding that 13 albacore tagged and released in the U.S. west coast fishery by personnel of the Southwest Fisheries Center have been recovered by Japanese longline fishermen operating in winter months within the region of the subtropic front. Most of the recoveries were made within a degree or two or 32° N and between 135° W and 180°.

The albacore caught by scientists on the Jordan was taken at a depth of 200 m in 12° C waer near 31°45° N, 144° W, a short distance south of the subtropic front. The fish weighed 19.196 kg and had a fork length of 100 cm. One mahi-mahi, one blueshark, one opah, and one snake mackerel were also taken during the cruise.

Problems were experienced in safely deploying and retrieving the gear and there were frequent entanglements of the branchlines (those lines that carried the baited hook). In retrospect it is not surprising that problems were encountered in initial use of unfamiliar and specialized gear. Aside from unfamiliarity with the gear, a large share of the difficulties was caused by extremely poor weather conditions. Strong winds and heavy seas and swell were

common throughout the cruise. The frequency and duration of gales and storms were greater than average November patterns suggest as typical. Also, the line and swivels chosen to complete the longline were not fully adequate for the conditions encountered. On the first set residual twist in the brand new line and the method of deployment caused 60 to 80 baited lines to tangle. In subsequent sets this record improved to only 17 to 96 lines. Heavy swells, occasionally exceeding 18 feet, during the last set caused 73 of 88 lines to entangle. Further fishing effort was cancelled at that point. As an experiment a vertical longline was assembled with modifications and deployed and worked satisfactorily. Clearly, the gear can be made to work once changes are made. Additional changes are needed in fairleads, blocks and reels to aid deployment and retrieval.

A second objective was to study and describe the subtropic front in a contrasting season of the year from spring-summer for which we have considerable measurements. The description will provide an understanding of the seasonal changes in the frontal system which is believed to influence the shoreward migration of albacore in spring. Additionally the oceanographic observations will provide ground truth for examining remote observation of frontal surface gradients via satellite.

According to Lynn, the oceanographic study was successful despite recurrent equipment problems throughout the cruise. Observations indicated there was a sharp division of the surface layer and deeper waters; thus the front was divided with the shallow and deep portions offset from one another. The offset was very much less than that observed in September by the NOAA Ship, Surveyor, along the same transects. A very large north-south meander was observed in the frontal gradients that was of the scale of the chosen transects. This was observed via satellite as well; it is evident that each data set will aid in interpretation of the other.

Jordan Used as Source Platform for Collection of "Ground Truth Data to Relate to Satellite Observations

During the November albacore-oceanography survey described above, the NOAA research vessel, Jordan, was also used for the collection of "ground truth" data which could be related to remotely-sensed observations from satellites. In cooperation with the Center, Dr. Roswell Austin of the Scripps Institution of Oceanography Visibility Laboratory, sent G. Edwards, a senior staff engineer, to oversee the collection of observation of atmospheric attentuation, cloud patterns, ocean water optical characteristics and ocean color (chlorophyll) aboard the Jordan. Dr. M. Laurs, Leader of the Albacore Fisheries Program, and Austin made arrangements through the National Environmental Satellite Service (NESS) for the NIMBUS-7 coastal zone color scanner to collect data in a large region in the vicinity of the Jordan's area of operation during the November cruise.

Oceanographer R. Lynn and Laurs requested that SIO personnel at the Scripps' Remote Sensing Facility collect infra-red temperature data from the NOAA-6 satellite during November. While the cruise was in progress, Laurs arranged a radio facsimile transmission of satellite-observed ocean fronts to the Jordan where Lynn used these observations to adjust the ship's track to obtain the best "ground truth" data.

During November the Remote Sensing Facility unfortunately experienced equipment failure and missed receiving two weeks of data. Lynn is arranging with NESS of Redwood City to obtain these lost data. Although processing of the data has barely begun it is evident that remote-sensed and "ground truth" data sets will reveal the in-depth significance of the surface thermal gradients observed via satellite and the satellite findings will provide spatial continuity to the widely-spaced oceanographic observation of fronts.

The study and monitoring of ocean fronts via satellites is proving to be an increasingly effective approach as advances are made in technology and processing techniques. The consensus is that the advent of the Scripps Remote Sensing Facility is opening new vistas in the application of satellites to fishery problems.

LARVAL FISHES, COASTAL EAST PACIFIC

Paper Reviewing Development of Various Organ Systems in Anchovy Prepared for Symposium

Dr. C. O'Connell reports that he will present a paper reviewing development of various organ systems in the northern anchovy at a symposium of the American Society of Zoologists in December 1979. The following excerpt is from the section on the eye:

The retina of the anchovy is undoubtedly functional when feeding starts at about 4 mm SL. It is composed of one type of visual cell, and these are more slender and abundant towards the temporal part of the eye. By 5 mm SL there is a point of maximum visual cell density not far from the ventro-posterior margin of the retina and perhaps 20° below the horizontal meridian, constituting an area temporalis. The center point of the area is identifiable from the lateral view because nuclei of the outer nuclear layer tend to be laterally displaced and slanted towards this point, probably to accommodate the close packing of the slender visual elements. The surface of the eyeball is also slightly peaked at this point, probably to accommodate increased length of the visual elements.

The lens retractor muscle does not appear until 7 mm SL, after which it increases steadily in size. The six oculomotor muscles, on the other hand, are myoblastic two days after hatching but well differentiated with typical teleost insertions around the periphery of the eye by 3.5 mm SL, when feeding activity should be starting. Considering these features, it is reasonable to assume that the early feeding anchovy larva has a well-defined axis of maximum visual acuity, and good eye mobility, and therefore can probably exercise an effective binocular vision in aligning itself to close objects. There is probably some depth of focus at the start, and the ability to accommodate to greater distances must increase as the retractor muscle grows.

The early anchovy larva has a simplex retina in which the one class of visual cell is presumed to be cones, whereas the adult has a well developed duplex retina with abundant rods as well as cones (O'Connell, 1963). Rod

nuclei were not present in appreciable numbers in larvae less than 13 or 14 mm SL, but the appearance of scattered mitotic figures in the outer nuclear layer of some specimens of about 10 mm SL indicates this to be the size when rod differentiation starts. Rods were found in Tilapia leucosticta 6 days after hatching, which is 6 or 7 days before the larva leaves the mother's mouth (Grün, 1975). Functioning rods were not found in Nannocara anomala, another cichlid, until day 16, although free swimming starts on day 5 (Wagener, 1974). Rods were first found at 20 mm in the herring, Clupea harengus (Blaxter and Pattie Jones, 1967), which accords reasonably well with development in the anchovy. Thus, while there are variations, the appearance of rods sometime later than the appearance of cones, and continuing recruitment of rods for a long period thereafter, is probably a widespread phenomenon among teleosts. Where the anchovy is concerned, at least, such a developmental sequence would seem to be adaptive to the changing feeding and behavioral patterns with growth as described by Hunter (1972). Early larvae feed only in daylight hours and thus the limited space in the retina is devoted to a relatively well developed photopic system. As vertical movement starts, swimming and perhaps feeding extending into periods and strata of dimmer light, the expanding retina is also providing space for the development of the scotopic system.

Research Focuses on Energy Cost of Spawning in Northern Anchovy

Dr. J. Hunter and R. Leong, Fishery Biologist, continued their analysis of the costs of reproduction in northern anchovy. Work this month focused on the energy cost of spawning. Three variables affecting energy costs of spawning are number of eggs spawned, size of eggs, and the initial costs of developing a mature ovary. The number of eggs in one spawning batch of the northern anchovy increases exponentially with female weight. According to the equation of Hunter and Macewicz (MS), the number of eggs in a spawning batch varies from 3350 eggs for a 1-year-old female (11.2 g) to 10,000 eggs for a 3-year-old femle (22.8 g). As a female produces about 20 spawnings per year, the total annual fecundity for anchovy is high. Batch fecundity in anchovy is highly variable as is the case for many other marine fishes. This variability may be caused by differences in egg size and feeding conditions experienced by the female. Laboratory studies indicate, however, that anchovy fed a high food ration grew about 7 times faster than anchovy in the sea, yet the batch fecundity was the same as that for field-caught specimens. Thus the variabiity in the size of spawning batches of anchovy in the sea may be caused principally by variation in egg size.

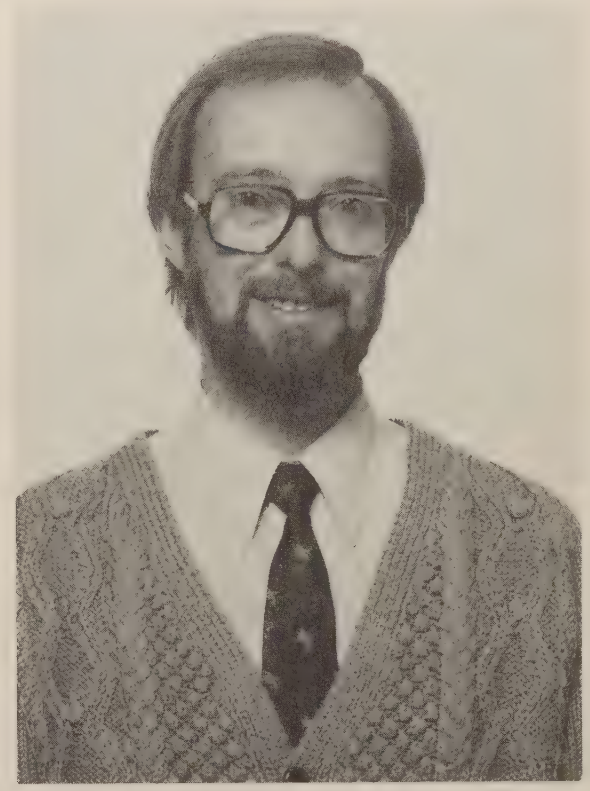
Egg size of anchovy varies seasonally with the largest eggs (0.031-0.032 mg dry weight) spawned in February-April and the smallest eggs (0.026 mg) occurring in September-October. The seasonal decline in egg size follows closely the seasonal decline in larval abundance and probability of spawning. Females may produce smaller eggs as the spawning season progresses or alternately the latter part of the season may be dominated by smaller females which may produce smaller eggs. Regardless of the mechanism, it probably is adaptive to produce smaller eggs in the summer and larger ones in the winter because the advantage accrues to larger eggs as the water temperature declines, owing to temperature effects on larval growth.

The energy investment in the initial development of the ovary appears to be small relative to that involved in spawning. Calculations by Hunter and Leong indicated that the total calories present in a mature ovary is equivalent to about two spawning batches, or about 10% of the energy expended in spawning annually. The annual variation in egg size represents an annual variation in the energy cost of reproduction of twice this amount.

Hunter and Leong concluded that the factors that may have the greatest effect on the reproduction capacity of the anchovy population are: 1) the age structure of the population which affects the batch fecundity and possibly the seasonal timing of reproduction, hence egg size; and 2) direct environmental and population effects on anchovy food in the sea, which probably affects energy stores and thereby regulates the number of spawnings produced by females and possibly the size of the eggs.

Expert on Fish Locomotion is New NRC/NOAA Associate at La Jolla Facility

Chance, according to Dr. Paul J. Webb, 34, latest recipient of a National Research Council/National Oceanic and Atmospheric Administration Post-Doctoral Research Associateship at the Southwest Fisheries Center, played an important part in determining the direction of his scientific career.



As Dr. Webb explained it, he was interested in animal locomotion and wanted to study bird flight. The recently completed wind tunnel at the University of Bristol in Bristol, England, was much in demand in 1967 and Webb, then a graduate student in zoology, was unable to conduct these studies. A water tunnel, however, was readily available and so young Webb decided to switch his attention to fish as an experimental animal. He quickly became involved in the hydrodynamic as well as biological problems of moving in water, and coupled with metabolic studies, he was able to determine swimming efficiency of fishes.

Subsequently, Webb earned his doctorate and joined Dr. J.R. Brett, world famous for this work on salmon energetics, at the Fisheries Research Board of Canada Biological Station in Nanaimo, British Columbia, to work on fish locomotion.

Continued Webb, "Here I was able to continue my interdisciplinary studies on fish locomotion. I was encouraged by Dr. Brett to publish this synthesis as a monograph, spanning the gaps in approaches by biologists, mathematicians, and physicists."

In 1972, Dr. Webb joined the faculty of the University of Michigan where he is now an Associate Professor of Natural Resources. He is the author of more than 20 papers, most of them dealing with the hydrodynamics and energetics of fish propulsion.

At the Center, Dr. Webb is continuing his research on fish locomotion, concentrating his efforts on determining routine energy costs and the role of locomotion in predator capture and prey escape. He is working primarily with larval and adult anchovy and observing changes during development and growth of the fish. He hopes to determine energy costs during various kinds of activity, using movie film and video recording which will be analyzed for duration and locomotor pattern.

According to Dr. John Hunter, Fishery Biologist and fish behaviorist at the Center with whom Dr. Webb is working, the research complements current work at the Center on the development, growth energetics, and swimming of fish and is closely allied to research conducted by Dr. Daniel Weihs of Technion University in Haifa, Israel, who was the NRC Associate at the Southwest Fisheries Center in 1978-79. The result of such studies, Hunter explained, is an improved understanding of fish energetics and ultimately fish production in the sea.

Said Dr. Hunter, "The Center is very pleased to have Dr. Webb as the NRC Associate. He is a world-recogized expert on locomotor energetics and the research he is carrying out has never been done before for larval fish."

Acceleration of Larval Anchovy Studied

Dr. Paul Webb, NOAA Post-Doctoral Associateship at the Southwest Center, working with Robert Carolla, an intern from Southampton College in New York here for one semester, are completing their experiments on the acceleration of larval anchovy. These data show a gradual improvement in ability to respond to stimuli from hatching, with 100% of the population able to respond by the time the yolk sac is absorbed. Performance data are in the process of being analyzed. Experiments have also been started on locomotion of the sanddab to determine how these fish might use the ocean bottom to improve their performance.

Nearshore Distribution of Juvenile Anchovy Investigated

In August and September 1979, midwater trawling on the David Starr Jordan was conducted by Richard Methot, graduate student at Scripps Institution of Oceanography, to investigate the nearshore distribution of juvenile anchovy and to collect samples from which the birthdate distribution of the 1979 cohort could be determined. In August, anchovy were collected in 20 of 30 trawls with a mean catch of 40 kg per positive 30-minute tow. In September, anchovy occurred in 34 of 35 samples with a mean catch rate of 94 kg per positive sample. Among the 54 positive samples, 46 were made parallel to nearshore isobaths and thus can be used to examine the distribution of juvenile anchovy. No consistent increase in catch rate occurred nearshore of the 100 fathom isobath, but the percentage of juveniles in the catch was much higher nearshore of 50 fathoms.

Percent (by number) of juvenile anchovy

Station	Month	Depth (fathoms)			
		<40	40-49	50-60	>60
Santa Catalina Is.	A			94,100	
	S	100,100	71	96	0,2
Santa Cruz Is.	A		50	3,4	
Encinitas	S	4,9,9,12			2,6,6
Oceanside	A	82		15	
Dana Pt.	A	47		15	
Santa Monica Bay	A	89	93	17	
	S	0,92,99	69,98	97	3,74
Pt. Dume	A	75		7	
	S	68,78	78	1,3	16
Ventura	A	17	0		
	S	2,13		1	
Median		61	71	15	6

Methot is not certain what advantage juveniles gain by aggregating close to shore. Food is generally more abundant close to shore, probably to an increasing degree through the autumn. However, it is not known when food abundance becomes critically low offshore. In June 1978, late larval anchovy (15-30 mm) collected 150 miles offshore were growing as rapidly as those collected close to shore; this implies that onshore gradients in prey abundance were insignificant or not utilizable. Otoliths of the few juveniles collected offshore will be examined for evidence of depressed growth rates.

Manuscript Completed on Effect of Rearing Container Size On Condition of Jack Mackerel Larvae

Gail Theilacker, Fishery Biologist, has completed a manuscript entitled, "Effect of rearing container size on morphology and nutritional condition of jack mackerel, Trachurus symmetricus, larvae." She found that size of container affected growth, nutritive condition, and possibly activity in jack mackerel larvae. In the feeding experiments, larvae grew faster and showed fewer signs of starvation in large (100 1) than in small (10 1) containers. These differences in growth and nutritive condition may arise because: 1) there is a lower probability of damage from contact with the walls; and/or 2) the same prey density in a larger container may permit the formation of larger good patches and thereby elevate the actual density of food encountered by the larvae; and/or 3) water chemistry in larger containers may be more favorable.

In contrast to results of the above feeding experiments, larvae starved in small containers survived two days longer and were larger than those in large containers. This indicates that activity may be affected by container size. Those in small containers may be less active, consume energy reserves in the tissues less rapidly, and therefore reach a larger maximum size, and live longer without food.

Because of these differences in growth, nutritive condition, and activity in jack mackerel, Theilacker urged caution when relating results from laboratory to field conditions. Further studies are needed to determine the minimum container size required to simulate natural conditions in the laboratory. Since spatial requirements of larval fish depend on locomotor patterns as well as on genetic adaptations of larvae to live with surface contact (Kinne, 1977), optimum container size will vary with fish species. In larval fish laboratory experiments container size is a variable that must be considered with temperature, light, food type and availability, and stocking density.

COMMERCIAL AND RECREATIONAL FISHERIES RESEARCH FOR MANAGEMENT

INP/CalCOFI Subcommittee on Aging Meets in Ensenada, Mexico

Dr. Gary Stauffer (La Jolla) and John Sunada (Calif. Dept. of Fish & Game) represented the U.S. at the Aging Subcommittee meeting in Ensenada, November 15. The subcommittee prepared the following "terms of reference" for review by the INP/CalCOFI Committee:

1. Provide and exchange fishery data to include

    a. commercial catch for year by geographic area and by month,

b. number of fishing vessels by month,

c. age and length composition and sex ratio of fish in the catch,

d. other biological data, such as sexual maturity and oil content when available.

2. Maintain quality control for catch sampling and aging of anchovies.

3. Provide annual status report for the anchovy fishery including analysis, and summary of catch samples, year class strength, and prediction of the recruiting year class size.

During the subcommittee meeting, several facts about the current year fishery for anchovies in Ensenada were reported. Through October the Mexican fishery had taken 153,800 short tons as compared to the U.S. catch of 45,837 tons. During the September-October period, Mexican and U.S. catches were 34,428 tons and 5,111 tons, respectively. The 1979 year class emerged in the Mexican fishery, as usual, in October. INP's samples from the fishery (which do not include Zapata's catch) indicate that the 1978 year class is less dominant in the Mexican fishery than it is in the U.S.

Plan for 1980 Groundfish Survey Discussed

Dr. Stauffer represented the La Jolla Laboratory at a NWAFC planning meeting, November 28-December 3 in Seattle, for the 1980 groundfish survey scheduled for next summer off Washington, Oregon and California. Also attending from California were Tom Jow (CF&G, Menlo Park), Ed Ueber (Tiburon), and Bill Lenarz (Tiburon). A review of research needs for the groundfish Fishery Management Plan (FMP) and a list of priorities for the survey cruises were main topics of discussion. Sable fish, shelf rockfish and hake were the species given the highest three priorities. For each species, the most important data needs were identified. For sable fish, for instance, stock identification and adult biomass were given highest priority.

Computer Program Written Which Examines Sighting & Effort Data

Research continues on the aerial survey and logbook analysis methods. Susan Picquelle, Statistician, has completed a computer program which examines both the sighting and effort data. For each CF&G block area, the program output displays (1) number of tons of fish sighted, (2) number of sightings, (3) number of times the block was searched, and (4) tons sighted per block search ("catch per unit effort"). This last item is being transferred to maps (one for each month) for a visual inspection of seasonal and geographical patterns. An analysis of covariance model will be applied to the data to discuss seasonal, diurnal, geographical and pilot effects.

Despite numerous setbacks in the computer processing system, Doyle Hanan of CF&G assigned to the La Jolla Laboratory, has completed the keypunching and editing of the 1975-79 anchovy vessel logs. When these are merged with the 1966-1975 data base, a catch-per-effort type of analysis will be performed.

Progress Continues on Fishery Management Plans

Public hearings for the jack mackerel plan, which was approved by the Pacific Fishery Management Council, have been scheduled in conjunction with groundfish plan hearings at Astoria, Oregon (December 14); North Bend, Oregon (December 15); Arcata, California (December 17); Monterey, California (December 14); Long Beach, California (December 15) and Seattle, Washington (January 5). Alec MacCall, Plan Team Chairman, has prepared a statement describing the jack mackerel Fishery Management Plan for presentation at the hearings. Various members of the jack mackerel team will be in attendance at these hearings.

The anchovy plan amendment, which was discussed at the October Statistical and Scientific Committee (SSC) meeting and approved for hearings by the Council on November 7 in Boise, Idaho, will be presented to the public in conjunction with the groundfish/mackerel hearings at Monterey and Long Beach, California. Also, public comment will be taken at a separate hearing in San Diego on January 8, 1980. The version of the amendment being submitted for comment proposes that the special allocation of the anchovy reduction quota for the northern permit area be revised during the last month or month-and-a-half of the reduction fishing season to allow the southern fishery to catch any surplus quota not being taken in the northern area. It does not propose that the special non-reduction quota be altered for a similar purpose.

New SIO Course in Fisheries Management to be Offered During Spring 1980 Term

Dr. D. Huppert, Task Leader, has been working closely with faculty and staff of the Scripps Institution of Oceanography and UCSD facility to develop a new course in fisheries management. The course is tentatively entitled, "Analytic methods in fisheries management." To be offered during the spring term 1980 as SIO279, the course will consist of 20 lectures divided into five groups: Introduction, Population Basis, Economic Basis, Institutional Basis, and Socio-political Basis. Lecturers include Dan Goodman (SIO), Jens Sorenson (UCSD Dept. Political Science and Center for Marine Affairs), Mark Machina (UCSD Dept. Economics), Daniel Huppert (NMFS, La Jolla), and Michael Orbach (UC, Santa Cruz).

Progress Made in U.S. Fishing Vessel Investment Study

Economist Jane McMillian reports that progress is being made on two fronts in the study of U.S. fishery vessel investment, development of the theoretical model and data acquisition. The model will specify theoretical

relationships between vessel construction activity and economic parameters such as fishing success, market price, operating costs, and vessel costs. The objective is to develop a useful behavioral model for each of several major U.S. fishery sectors, and to determine whether and to what extent the Fishery Conservation and Management Act is responsible for encouraging the current boom in vessel building.

The study requires information on the capital stock of vessels. Data on the total number of vessels participating in each fishery and area and the number of newly constructed vessels are being obtained from the Vessel Operating Units file, which was provided by the NMFS Washington D.C. office. These data will be combined with estimates of construction costs to obtain an estimate of capital stock. The data on construction costs for vessels participating in various fisheries were obtained from the 1979 NMFS telephone survey of boatyards.

The Vessel Operating Units file is complete only for the years 1965-1975. Data for 1976 and 1977 are available from a Coast Guard file of all registered fishing vessels over 5 tons. This file includes the following data items: vessel name and number, year built, tonnage, horsepower, home port, length, and other items. This data tape is also available from NMFS headquarters. Preliminary data for 1978 and 1979 are from the 1979 NMFS telephone survey of all boatyards building fishing vessels in the U.S.

Finding Made of Non-Isometric Growth in Rockfish Otoliths

Fishery Biologist John MacGregor reports a finding of non-isometric growth in rockfish otoliths. For these species for which large numbers of specimens in a wide range of lengths are available. MacGregor has found an expected good correlation between standard length and otolith length. However, notes MacGregor, the otoliths grow proportionately less rapidly than body length.

For example, in vermilion rockfish 50 mm SL, the otolith is 6.1% of SL, while in a fish of 400 mm the otolith is only 4.4% of SL. In a 50 mm greenspotted rockfish, the otolith is 6.7% of SL while at 400 mm it is only 4.6% of SL.

The significance of this finding is that lengths back-calculated from otolith annuli could contain considerable error, with the error increasing with the increasing size of fish. A vermilion rockfish that was 100 mm SL at age X would back-calculate to 109 mm from a 200 mm fish and 132 mm from a 400 mm fish. For a greenspotted rockfish 100 mm at age X, the corresponding back-calculated lengths would be 110 mm and 140 mm.

MULTISPECIES TAXONOMY

Several Manuscripts on Fish Larvae Near Completion

Progress continues on the identification of CalCOFI eggs and larvae and entry of the data on the computer, with approximately half of the 1978 samples processed according to Dr. G. Moser, Task Leader.

Several manuscripts by members of the staff of the Multispecies Taxonomy are nearing completion. A paper by J. Butler and G. Moser of the SWFC and G. Hageman and L. Nordgren of the Univerisity of Southern California describing the eggs and larvae of three species of Paralabrax (kelp bass and barred and spotted sand bass) from specimens reared in the aquarium is in draft form. The manuscript will be in final form when the illustrations are completed. A manuscript by Moser and Butler describing the larvae and pelagic juveniles of Sebastes dallii, the calico rockfish, has been completed. This marks the first time an eastern Pacific rockfish has been reared through to the juvenile stage. Betsy Stevens is finishing her manuscript on Hypsoblennius larvae and Susan D'Vincent is completing one on the larvae and early juveniles of Pacific butterfish. These will be submitted for inclusion in the CalCOFI reports. Barbara Sumida MacCall is finishing her description of gut contents of the Pacific hake, also to be submitted to CalCOFI Reports.

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Two biologists from CICIMAR, Instituto Politechnico Nacional, La Paz, Mexico, completed a month of training in ichthyoplankton identification and survey technqiues. Cruz de Carmen Juarez Olvera and Elizabeth Garcia Woodwad worked in the laboratory from November 5 to November 30 developing the skills for identification of samples from an ichthyoplankton program that is planned for their laboratory.

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Dr. Koichi Kawaguchi of the Ocean Research Institute, Tokyo, is working in the laboratory for a 6-month period. He has been reviewing techniques for identifying ichthyoplankton and is preparing a taxonomic revision of the genus Nansenia. This is a study that was begun by John Butler and which will include him as a co-author.

Oceanic Fisheries Resources Division

TUNA RESOURCES PROGRAM

Tuna Resources Project
Scientists Attend ICCAT Meeting

The sixth regular meeting of the International Commission for the Conservation of Atlantic Tunas (ICCAT) was held in Madrid, Spain, November 5-20, 1979. The meeting was in two parts: the meeting of the Standing Committee on Research and Statistics (SCRS), November 5-13, and the meeting of the Commission, November 14-20. Scientists of the Southwest Fisheries Center (SWFC) participated in both sessions.

SWFC scientists attending the SCRS meeting were Dr. Gary Sakagawa, Chief, Oceanic Fisheries Resources Division and leader of the U.S. scientific delegation, Dr. Wes Parks, Leader of the Tuna and Billfish Resources Program, Dr. Norm Bartoo, Fishery Biologist, and Al Coan, Mathematician. Southeast Fisheries Center (SEFC) scientists attending were Dr. Bill Fox, Center Director of the SEFC, Susan Brunenmeister, Ray Conser, Mark Farber, and Mike Parrack. Scientists from 12 of the 19 member countries attended the SCRS meeting, reviewed 115 documents, and prepared status of stock reports on Atlantic tuna and billfish stocks to assist the Commission to identify needed conservation measures.

The SCRS's appraisal of yellowfin tuna stocks was unchanged from that in 1978. Stocks are heavily fished, particularly in the eastern Atlantic, where recent catch increases appear to be the result of offshore expansion of the fishery. Recent catches are within the range of estimated maximum sustainable yield. Any increases in equilibrium yield-per-recruit will depend on effective application of the 3.2 kg minimum size limit and availability of large fish. The SCRS recommended that every effort be made to apply the minimum size limit regulation.

The SCRS found skipjack tuna in the eastern Atlantic to be fished at a high level. Evidence continues to indicate the presence of a significant underexploited western Atlantic stock. The results of developing a western Atlantic fishery depend on stock structure of the population in the Atlantic. If there are separate eastern and western stocks, increases in western Atlantic effort could result in sharp increases in total catch. If there is one Atlantic wide stock, effort increases may only lead to small increases in total catch.

The SCRS assessed bigeye tuna stocks to be in good condition. Stocks appear to be fished at a high level and recent catches are within the range of estimated maximum sustainable yield. Increasing age-at-first-capture would increase equilibrium yield-per-recruit. However, the benefit of regulations to increase bigeye and skipjack are often taken in mixed catches. The SCRS reiterated its 1978 recommendation for a common 3.2 kg bigeye/yellowfin

minimum size limit. Such regulation would increase bigeye yield-per-recruit, and since small yellowfin are sometimes landed as bigeye, the bigeye regulation would facilitate effective application of the 3.2 kg yellowfin size limit.

As in 1978, the SCRS found albacore to be harvested at about the level corresponding to maximum sustainable yield. Changing fishing patterns toward larger fish in the fishery for the north Atlantic stock may be increasing equilibrium yield-per-recruit. The SCRS in 1978 expressed concern over possible recruitment failure due to the apparently very reduced spawning stock and increasing variable recruitment. New analyses alleviate some of this concern suggesting that the probability of recruitment failure is low. However, the committee recommended that stock condition be closely monitored since adult stock is still estimated to be low.

The SCRS found bluefin tuna abundance in the eastern Atlantic and Mediterranian to be increasing. In the western Atlantic apparently weak recent year classes suggest that juvenile abundance is probably depressed and may decrease. Western Atlantic adult abundance is expected to increase. The 6.4 kg minimum size limit adopted in 1975 has probably increased potential yield-per-recruit. Further increases in minimum size would probably further increase yield. The limit on fishing mortality, also implemented in 1975, appears to have stabilized fishing mortality rates. The SCRS recommended retaining both minimum size and mortality limit regulations.

The Atlantic wide white marlin stock appears to have been exploited in recent years at levels at or above that corresponding to maximum sustainable yield. Blue marlin stocks appear to have been overexploited since the early 1970's. No management measures were recommended. However, the SCRS recommended that the fisheries be closely monitored and methods to reduce effort should be considered should further analysis continue to show overfishing.

Sakagawa, Parks, and Fox attended the Commission meeting as advisors to United States Commissioners Carmen Blondin and Dr. Frank Carlton. Seventeen of the 19 member countries were represented.

The Commission's 1978 adoption of a recommendation for a bigeye minimum size limit, subsequently found to be invalid, was reviewed. A slightly altered version prohibiting the taking of bigeye less than 3.2 kg until December 31, 1983 was adopted. The Commission's recommendation to limit fishing mortality on northern bluefin tuna to recent levels, due to expire in October 1980, was extended an additional two years.

The Commission reviewed the special skipjack research program budget. Proposed 1980 budget increases to account for inflation were approved. In order to review the regular Commission and skipjack program budgets for 1981, the Commission decided to hold its second special meeting in 1980. The meeting is scheduled for the week beginning on November 12, 1980 in Madrid.

Biological Sampling of Foreign Imports of Atlantic Tunas Continues in Puerto Rico

Atlantic-caught tunas transshipped to Puerto Rico have been sampled routinely for fork length, weight and species composition data by Biological Technician Eugene Holzapfel of the La Jolla Laboratory since March 1975.

Results of sampling during the period January thru November 1979 are reported by James Renner, Fishery Biologist, as follows:

Species	Gear	No. of Samples	No. of Fish Sampled	Tonnage Sampled (MT)
Yellowfin	Baitboat	48	2902	727
Skipjack	Baitboat	24	1215	3170
	Purse Seine	10	507	4283
	Unknown			
Bigeye	Baitboat	37	1848	395
Albacore	Longline	4	181	1032
TOTAL		123	6653	9607

Tuna Catch of U.S. Purse Seiners Fishing in Atlantic Decreases

As of November, seven U.S. purse seiners participated in the 1979 tropical Atlantic tuna fishery (20 vessels participated in 1978). The total catch of tropical tunas from this fleet is estimated at 6,200 MT, a decrease of approximately 67% compared to catches reported to 1978.

Catches from six of these vessels have been sampled for length frequency and species composition. As of November, 729 yellowfin tuna, 700 skipjack tuna, 173 bigeye tuna, and 54 tuna of other species have been sampled. The majority of the yellowfin and bigeye tunas sampled were large fish, 100 to 160 cm in fork length.

Billfish Management Plan Development Resumes

On November 9, 1979, the Pacific Fishery Council considered a recommendation by the Billfish Advisory Sub-panel to continue development of the Billfish Management Plan.

Work on the Billfish Plan was postponed in August 1979, pending the outcome of litigation to determine the authority of the State of California

over its citizens beyond the 3-mile territorial sea. Pacific Council directions to the Billfish Plan Development Team headed by J. Squire of the La Jolla Laboratory is to continue developing the Plan in preparation for public hearings. The Team will resume activities at a meeting scheduled at the SWFC on January 11, 1980.

MARINE MAMMAL ASSESSMENT AND MONITORING PROGRAM

Theoretical Sampling Program Designed to Classify Size Range of Tunas Attracted to Logs

Bruce Wahlen, Biological Statistician, completed a theoretical sampling program designed to classify the size range of tuna that were attracted to an artificial aggregating device. Porpoise schools are known to associate generally with larger tuna than those found with logs. The sampling program was developed to decide how many sets would be required on an artificial "log" before the size of fish that it collected could be determined.

Population Parameter Project

A joint NMFS/Inter-American Tropical Tuna Commission porpoise school size study aboard the U.S. tuna seiner, Gina Anne, was completed on November 25. This two-month experiment was designed to compare estimates of porpoise school size from aerial and shipboard observers with ground truth counts obtained at backdown. The counting technique used 4 observers aboard 3 speedboats attached to the apex of the backdown channel, and it proved to be very successful. These counts and estimates will also be compared with an independent set of estimates made from aerial photographs. Motion pictures and still photographs were also taken and will be used to develop a training program to teach marine mammal observers how to estimate accurately the number of animals in a porpoise school.

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Dr. Gary Sakagawa and other senior staff members met with representatives of LMR and tuna industry's expert skippers' panel to discuss operational procedures and cruise planning for the January-February 1980 porpoise research cruises of the David Starr Jordan and Townsend Cromwell. The major topic centered around observer effectiveness and the scheduling of watch periods.

MARINE MAMMAL BIOLOGY AND TECHNOLOGY PROGRAM

Dolphin Aging Technique Developed

Dr. Albert C. Myrick, Jr., Leader of the Marine Mammal Age Determination Project, reports that he has developed a reliable method for evaluating

layering patterns in teeth of dolphins of Stenella spp. that appears to correspond closely with time. Developed from an analysis of thin-sectioned teeth of Stenella attenuata and Stenella longirostris arranged in ontogenetic series, the method standardizes the definition of countable layers in dentine. According to Myrick, for all specimens he has examined thus far, the layers decrease regularly in thickness according to the following unvarying dimensions.:

1st and 2nd layer	.024 mm
3rd layer	.018 mm
4th layer	.015 mm
5th layer	.012 mm
6th layer	.009 mm
7th and subsequent layers	.006 mm

Myrick says that the same pattern occurs in S. attenuata, S. longirostris, and Delphinus delphis. Recently, this standardized method has been intercalibrated with time by examining the dentinal layers in the teeth of two Hawaiian spinners of known age, donated by Sea Life Park in Hawaii. Using the method, Myrick counted 5 and 8 layers respectively for the two specimens. Life history records received for these two animals indicate ages of 5 and 8 years.

The next problem is to determine whether the layering rates are constant. This will be tested in Stenella spp. by a one year tetracycline-marking and tooth-extraction experiment that will monitor layer depositional rates in teeth of five Hawaiian spinners held by Sea Life Park. The park has just been awarded a contract for this work that will begin in January 1980.

Myrick says that teeth in Tursiops truncatus show a pattern that differs from that of Stenella and Delphinus. He is working on a formula for T. truncatus that will be tested for time with extracted, tetracyline-marked teeth of bottlenosed dolphins being used in a layer-rate monitoring project now being conducted under contract with Hubbs-Sea World Research Institute, San Diego.

Marine Mammal Fishery Conflicts Studied

The California Department of Fish and Game, under contract to the NMFS/SWFC, is surveying several fisheries to determine the nature, frequency, and impact of direct conflicts between marine mammals and fishery operations. The conflicts under study include damage to catch, damage to fishing gear, and take of marine mammals by fishermen. The joint NMFS-California Fish and Game study began in FY79 and will extend through at least FY80. During the first year, California Fish and Game has concentrated on conflicts in the salmon fisheries of northern California involving harbor seals, Phora vitulina, and sea lions, Zalophus californianus, with some attention given to other commercial fisheries (trammel and gillnet for several species, trawling for bottomfish, and others) and recreational fisheries (piers, partyboats, and

small private boats). Major emphasis will shift in 1980 to the commercial fisheries of southern California, especially the roundhaul fisheries for anchovy, mackerel, bonito and squid, and gillnet and trammel fisheries for white sea bass and other species. The data are gathered mainly by temporary seasonal aids, through dockside interviews and, where possible, by riding the vessels to observe interactions directly.

A meeting was held on November 16 at the SWFC to review progress and to plan the research for the coming year in general terms and in terms of minimal sample sizes needed to allow evaluation of impacts on the fisheries and on the marine mammal population. The meeting was chaired by Fishery Biologist J.M. Coe at the La Jolla Laboratory. Also attending were W.F. Perrin, W.E. Stuntz, J.R. Henderson, and N. Lo of the SWFC, and M. Odemar and D. Miller of the California Fish and Game.

The data thus far indicate that conflicts may be significant in salmon gillnetting, but probably negligible in salmon trolling and at fishing piers. The data for other fisheries are still too few for even tentative conclusions.

Age Determination Volume Nears Publication

The International Whaling Commission (IWC) will publish the proceedings (workshop report and contributed papers) of the conference on age determination of odontocete cetaceans held here in September 1978. W.F. Perrin, Supervisory Fishery Biologist and A.C. Myrick, Wildlife Biologist organized the conference and are editors of the volume. The workshop report and all but a few of the papers have gone to the printer and publication is expected in 1980.

PACIFIC ENVIRONMENTAL GROUP

FISHERY/ENVIRONMENTAL MODELING AND FORECASTING

Manuscript on California Current Surface Heat Flux Climatology Near Completion

D. Husby, Oceanographer at PEG and LCDR. Craig Nelson, NOAA Corps, have completed the first draft of a manuscript entitled, "Climatology of surface heat fluxes over the California Current region" for publication in the NMFS Tech. Report Series (SSR-F). This work complements the earlier report of Nelson (1977) which summarized the wind stress and wind stress curl over the California Current. Modeling of the generation of temperature anomalies in the California Current requires specification of both the wind driven and thermohaline components of the flow field. The thermohaline circulation results from exchanges of heat and salt across the sea surface.

Climatic changes in the ocean/atmosphere energy transfers may modify the location and intensity of coastal upwelling along the west coast of the Americas which, in turn, may cause variability in the recruitment to the fish stocks. This report presents the long-term composite monthly fields of heat exchange processes on the 1° latitude-longitude grid displayed in Figure 1. The grid covers the coastal region from Vancouver Island in British Columbia south to Baja California and extends 1100 km offshore. The monthly fields of incident short-wave solar radiation, effective back radiation (net long-wave), latent heat flux, sensible heat flux and net heat exchange across the sea surface provide a climatological data base of the "normal" seasonal variability of the ocean/atmosphere energy exchanges and define the important areas of energy exchange. The heat exchange processes are calculated from the historical surface marine weather reports obtained from the National Climatic Center files covering the period from the mid-1800's to 1972. The spatial distribution of the reports is biased to the major shipping lanes as indicated by the contours of the mean monthly numbers of observations for each 1° square; however, 70% of the 1° squares contained an average of more than 50 observations per month.

The results of the analysis of the monthly heat exchange fields showed that the net heat exchange is primarily determined by the balance between the incident solar radiation and the outgoing long-wave radiation. The turbulent fluxes of latent and sensible heat are of small importance due to low wind speeds and small air-sea temperature difference. On the annual time scale the entire grid experiences a net heat gain to the ocean with the areas around the upwelling capes, Capes Blanco and Mendocino and Conception and Punta Eugenia, having large net heat gains. This is primarily due to small latent heat flux loses, sensible heat gains and relatively low cloud cover during the summer months. Figure 2 shows the annual cycle of net heat exchange in 1° squares along the coast with heat losses in dark shading. The largest net heat gains occur during July at Cape Blanco (43° N), and Cape Mendocino (40° N) and Punta Eugenia (26-27° N). These large net heat gains, particularly at Capes Blanco and Mendocino, have important implications for the modeling of the heat budget of these upwelling areas. These large heat gains occur during the times of maximum upwelling and, thus, must be offset by advection of cool water to maintain a steady state temperature distribution.

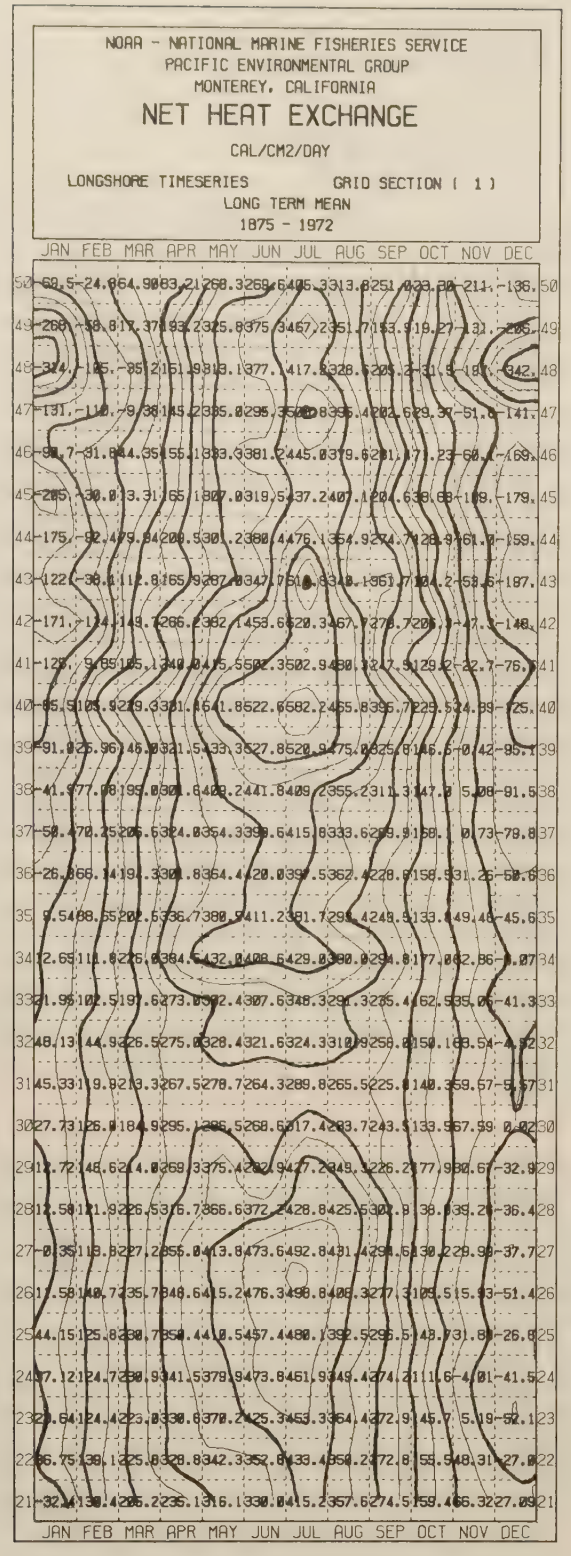
NOAA - NATIONAL MARINE FISHERIES SERVICE
PACIFIC ENVIRONMENTAL GROUP
MONTEREY, CALIFORNIA
NET HEAT EXCHANGE
CAL/CM2/DAY
LONGSHORE TIMESERIES
GRID SECTION (1)
LONG TERM MEAN
1875 - 1972
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

Figure 1

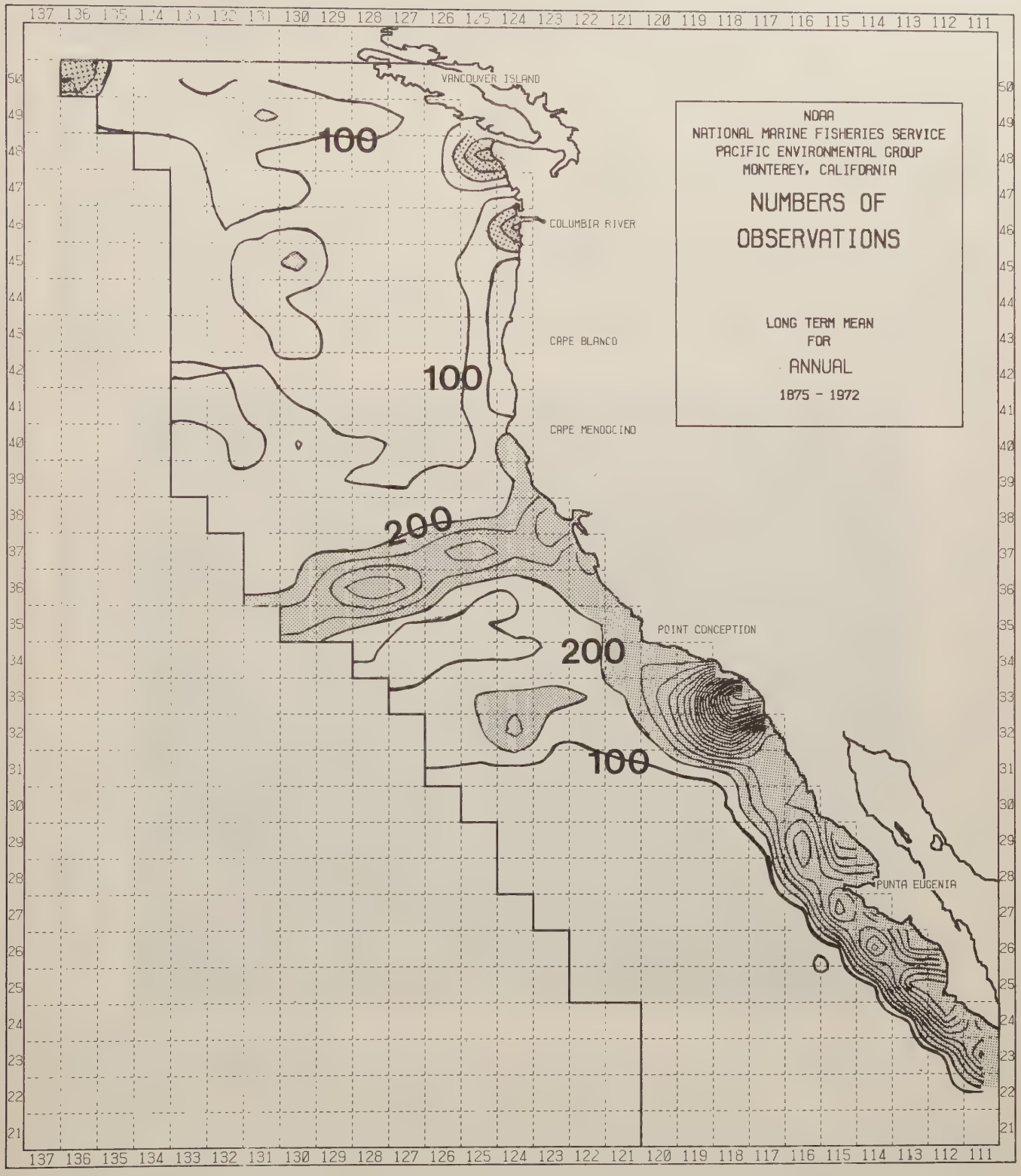
NOAA
NATIONAL MARINE FISHERIES SERVICE
PACIFIC ENVIRONMENTAL GROUP
MONTEREY, CALIFORNIA
NUMBERS OF OBSERVATIONS
LONG TERM MEAN
FOR
ANNUAL
1875 - 1972
VANCOUVER ISLAND
COLUMBIA RIVER
CAPE BLANCO
CAPE MENDOCINO
POINT CONCEPTION
PUNTA EUGENIA
100
100
200
200
100

Figure 2

TIBURON LABORATORY

FISH COMMUNITIES INVESTIGATION

Shortbelly Rockfish Studied During Cruise of Research Vessel, Oregon

The shortbelly rockfish, Sebastes jordani, a potentially rich, but as yet little-used resource, was the object of study this month off central and northern California from the NOAA research vessel, Oregon (Figure 1). The cruise had a dual purpose: to learn more about the ecology and distribution of the shortbelly, and to evaluate various collecting devices and techniques for use in forthcoming studies of predator/prey relationships in this species.

Figure 1. One haul of shortbelly rockfish taken by bottom trawl from research vessel Oregon during this month's cruise off central and northern California.

Dr. William H. Lenarz, Leader of the Rockfish Analysis Task, and Fishery Biologist Tina Echeverria have developed a hypothesis based on results of earlier cruises, namely, that many female shortbellies spawn only after migrating southward in the winter. Among shortbellies sampled during the summer of 1977 (Northwest and Alaska Fisheries Center Rockfish Survey), females were more numerous than males at most stations north of 35° N, and their gonads were in resting condition. Then, in the late winter of 1979 (cruise of the Spanish research vessel, Freire Lopez), females were taken in lesser numbers than males at most of these northern stations, but in greater numbers to the south, and their gonads were either close to spawning, or spent. The collections made from the Oregon this month proved similar to those made during the summer of 1977 in that proportionately more females were taken north of 35° N. Although there was no evidence of a migration at this time, the females carried fertilized eggs. If the migration hypothesis, therefore, proves to be an actuality, the southward movement of females must occur within the next three months. In addition, the collections made this month continue to suggest that size and age of shortbellies increases with sea floor depth. Support also was added to earlier indications that the 1976 year class is weak compared with the 1975 and 1977 year classes.

Fishery Biologists Tony Chess of the Fish Communities Task, and Susan Smith, of the Fisheries Development Investigation, used hydro-acoustic tracings and preliminary analysis of food habits to outline the diel activity pattern of the shortbelly. The species appeared to feed primarily at night while in dispersed assemblages in the water column, and its major prey at this time was euphausiids, especially Euphausia pacifica. At daybreak, the fish descended toward the sea floor where at depths of about 150 to 250 m, they concentrated in dense aggregations.

In their use of various types of collecting gear, the scientists found the Marinovich midwater trawl to be an unsatisfactory device for capturing shortbellies, since it precluded sampling the dispersed nocturnal assemblages. Similarly, the bongo nets proved to be ineffective samplers of larger zooplankters, whereas the Issacs-Kidd midwater trawl was limited in its ability to capture smaller zooplankters. For example, the bongos and the Issacs-Kidd, when towed over the same track and at the same depth, sampled sizes of Euphausia pacifica as follows: bongos - $\bar{X}$ = 11.4 mm, range = 9.0 - 13.2 mm; Issacs-Kidd - $\bar{X}$ = 16.0, range = 11.0 - 22.0.

FISHERIES DEVELOPMENT INVESTIGATION

Processing and Marketing Studies Continue for Underutilized Fish and Fish Products

During the research vessel Oregon cruise (reported in detail elsewhere) Tiburon Laboratory personnel captured shortbelly rockfish, Pacific sanddabs, and eggs from various species of rockfish. Samples of these, along with rock crabs caught at Point Reyes, were subsequently sent to Japan for market

evaluation. Some of the potential users who will receive samples are: (1) A catering firm which prepares around 300,000 lunches daily. (2) Supermarkets. (3) Consumer cooperatives. (4) A firm which specializes in marketing cocktail appetizers. Some of the shortbelly rockfish was processed into "surimi," a fish paste used in making Japanese fish cake products ("kamaboko," "agemono," "chikuwa"). Samples of surimi were also sent to Japan for evaluation by a fish cake manufacturer. Tiburon Laboratory personnel participating in an informal taste test of steamed and fried fish cake made from shortbelly rockfish liked both products. The texture, however, did not meet Japanese standards for first grade kamaboko. Jill Souder, a student at the University of California, Davis, took samples of shortbelly rockfish surimi and minced flesh, to study effects of a carbon dioxide environment on the storage life. The Tiburon Laboratory is cooperating in this project with Sea Grant and Souder, who has a study grant from the California Seafood Institute.

King Salmon Held in Salt Water Pens at Tiburon Released into Bay

Roger Green, Leader of the Recreational Fisheries Improvement Program, reported that the king salmon, held in salt water pens at Tiburon Laboratory since August 22, 1979, were released November 23 and 24. The release numbered 12,723 fish out of the original delivery of 76,000. The reasons for this poor survival are unclear. Daily removal and counts of floating dead and dying fish account for 5,318 mortalities with 4,947 of these from the first month of pen-rearing when an outbreak of myxomycetes bacterial skin infections coincided with high water temperatures. Often, the dead and dying fish that appear at the surface account for only 10 percent of total mortalities, but even if this is the case, there are still approximately 23,000 fish unaccounted for. The released fish appeared to be in good condition. Growth was rapid during pen-rearing--from 12 gm at delivery to 74 gm at release.

Four king salmon were taken during bi-weekly gill net sampling at the pen-rearing site. Two of these were nose-tagged fish from last year's release.

Two Carlin tags were sent in by anglers. One, locally caught, was from last year's king salmon release; the other from the laboratory's 1976 king salmon release, was caught off of Vancouver Island, British Columbia.

PHYSIOLOGY INVESTIGATION

Pollution Physiology Research Paper Presented at Symposium

Dr. Jeannette A. Whipple and Mickey Eldridge presented a paper titled: "Ecological perspective of the action of monoaromatic hydrocarbons on marine and estuarine fishes" at the Fourth Symposium on Pollution and Physiology of Marine Organisms, Milford, Connecticut. The paper surveyed the little that is known about the actions of monoaromatics on all life stages of a selection of

estuarine fishes which differ behaviorally, physiologically, and phylogenetically. Much of November was spent preparing this manuscript for publication. It and other papers presented at the meeting will be published by Academic Press in the near future.

Work continues on a number of other manuscripts by members of the Physiology Investigation staff. They include early life stage energetics of striped bass and studies of physiological effects of benzene on different life stages of striped bass.

SOUTHWEST REGIONAL DATA MANAGEMENT AND ADP OPERATIONS

Progress Reported on Coastwide Data System

Satisfactory progress continues on the formulation of the Coastwide Data System, according to F. Kellenberger, Data Systems Manager. The 1974 commercial landing data for Washington, Oregon and California are in final processing and loading into the summary data bases has started. Following the numerous techniques advised by INFONET personnel, the estimated cost has been reduced by 2/3 for producing the summary files for 3 years of data. The recommended techniques included the pre-sorting of the data sets, the generation of intermediate data bases with final merge, the replacement of certain program command constructs, and the elimination of secondary keys.

Russell Porter of Pacific Marine Fisheries Commission reviewed the summary file, and concluded that the summary file format is correct and that loading of the landings data could be started. The raw data contain about 3 million records and the summary file will contain about 1-1/4 million records. The 1974, 1975 and 1976 vessel data for the three states have been loaded into a data base. The vessel data contains about 20,000 records.

* * * * * * * * * * *

In other data management activities, Kellenberger reported that several meetings were held this month concerning the mid-December test of the ORION (Oceanographic Research Interactive Onboard Network). Installation aboard the R/V David Starr Jordan, the onboard test of the system, is still planned for mid-December when the ship will return from drydock in Long Beach. Pete Eichhorst began work under contract to interface operationally the several intelligent sub-systems of the ORION system. The ORION system will collect and analyze CalCOFI, XBT, shipboard housekeeping, navigation, and tracking, data onboard the R/V David Starr Jordan. The system consists of a Hewlett-Packard (H.P.) computer, two H.P. 2640 CRT units and an analog-digital computer.

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Oden Burris, Computer Programmer, generated two reports during November for Pat Grice, California Coastal Commission, who is analyzing the requirements for port expansion in California. From the 1978 CF&G vessel registration file, one report tabulated the selected vessel characteristics by home ports. The second report portrayed the frequency distribution by size classes for vessels by home port. For J. Bybee of Southwest Regional Office, Burris generated similar reports for planners in developing port expansion programs in Bodega Bay and San Francisco Bay.

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The Billfish Data Base Management System internal and external program documentation was completed in November. The draft user manual was completed and it is presently being reviewed by the users. All documentaion for the system should be finalized in December. The system contains recovery and releasing information on billfish utilizing three data bases-address, release and recovery.

Dr. Gary D. Brewer, University of Southern California, Institute for Marine & Coastal Studies, is designing the nearshore plankton sampling for the Ichthyoplankton Coastal and Harbor Studies. In a letter to Dr. Paul Smith, Dr. Brewer requested the description of data elements in the Center's CalCOFI system. In response, Dorothy Roll, Systems Analyst, wrote a report defining the structure of the 7 major CalCOFI data base files, and for each file specified the common data elements through which the data base files are interlinked. Included with the report were the definition/description of all data elements in STACDB (the master file of all stations occupied) and STOCDB (the net tow station data). The description documents will assist Brewer in structuring his files for data compatibility in order to augment data exchange between systems.

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Roll also reports that the data validation process for the CalCOFI Data Management System on INFONET are not cost efficient due to the referencing of data elements with multiple data bases. The feasibility of converting the edit/data verification programs to the VAX system is being considered. For this reason, Roll, Smith and Rich Charter met with Ed Coughran, Director of the Computer Center at the University of California, San Diego on November 2. They discussed the capabilities of the VAX computer in reference to the current and future requirements for the CalCOFI data management system, the impact of the projected workload on the University's computers and our required turn-around times during deadline dates. A follow-up meeting was held the following Friday, November 9, attended by P. Smith, R. Charter, J. Zweifel, L. Eber and D. Roll from the La Jolla Laboratory and E. Coughran and J. Fitzsimmons of the Computer Center. Fitzsimmons agreed to review the listing of a data verification Fortran program implemented on INFONET and study the alternatives on conversion to VAX system.

* * * * * * * * * *

Several meetings on data management were held during November. The Tuna Data Management Committee met at the La Jolla Laboratory, to plan the development and implementation of a Southwest tuna system. Members of the committee are Fletcher Riggs, Honolulu Laboratory, Al Coan, Oceanic Fisheries

Resources Division and Fred Kellenberger. The committee decided to concentrate efforts on defining present and future requirements.

The Southwest Fisheries Center, Region Data Management Committee met at the La Jolla Laboratory on November 29, 1979. The committee consists of data management personnel from the various laboratories/divisions within the SWFC and SWR. The committee discussed data management activities, including the recently completed Potomac Research Incorporated (PRI) ADP Requirements Study.

* * * * * * * * * *

Fred Kellenberger traveled to Portland to attend the Pacific Marine Fisheries Commission Data Goals Committee meeting on data requirements. It was decided at the meeting that the committee should concentrate on meeting the data requirements for the Salmon, Shrimp and Groundfish Fishery Management Plans (FMP).

MISCELLANEOUS

HONORS AND AWARDS

November 26 - Center Director Barrett presented length of service pins at a general staff meeting at the Honolulu Laboratory to the following employees: Carole A. Yukihiro, 25 yr. and Marian Y.Y. Yong, 15 yr.

SEMINARS

La Jolla Laboratory

November 6 - Dr. Dorothy Soule, Allan Hancock Foundation, University of Southern California discussed the "Beneficial effects of controlled discharge of wastes in the marine environment."

27 - Mr. I.T. (George) Clement of the New Zealand Ministry of Agriculture and Fisheries spoke on "Pelagic fisheries research in New Zealand."

Tiburon Laboratory

November 19 - The fifth joint seminar with San Francisco State University/Tiburon Laboratory was held at the Tiburon Center for Environmental Studies (San Francisco State University). The seminar was presented by Philip Meyer of the California Water Policy Center (U.S. Fish and Wildlife Service), Sacramento, California, and was entitled: "The treatment of uncertainty in environmental studies and decisionmaking." The seminar was co-chaired by Dr. Erwin Seibel, Director, Tiburon Center for Environmental Studies, and Edward Ueber, Tiburon Laboratory.

TRAINING

November 5-8 - Dorothy Roll, La Jolla Laboratory, attended the Analysis and Design of Word Processing Systems course in San Francisco, CA.

November 26-30 - Maureen Woods, Tiburon Laboratory, attended the Federal Interagency Field Librarians' Workshop.

VISITORS

Honolulu Laboratory

October 31 - Narciso D. Monfort, M.D., President, Philippine Federation of Fish Farms Products, Inc., Mandaluyong, Metro Manila, Philippines, visited the Laboratory. Shomura made arrangements for Monfort to visit several aquaculture facilities on Oahu.

November 6-9 - The Honolulu Laboratory was host to Dr. Eric Silas, Director, Marine Fisheries Institute, Cochin, India. In addition to spending some time with the Laboratory Director and at the Kewalo Research Facility and the Library, Silas visited Oceanic Institute, Anuenue Fisheries Research Center, State Department of Planning and Economic Development, Hawaii Institute of Marine Biology, East-West Center, Bishop Museum, and Aquatic Farms.

15 - Emilio Gapit, Librarian, SEAFDEC, Iloilo City, Philippines, visited the Honolulu Laboratory Library.

20 - Ronald Powell, Raratonga, Cook Islands, Norm Brindo-Vas, Hawaii Marine, Kealakekua, Hawaii, and Mike McCoy, Micronesian Maritime Authority, Ponape, Eastern Caroline Islands.

La Jolla Laboratory

Oceanographers and Fishery Researchers
from People's Republic of China
Visit Southwest Fisheries Center

A notable first for the Southwest Fisheries Center this month was the visit on November 29 of a 10-person delegation of oceanographers and fishery researchers from the People's Republic of China (PRC).

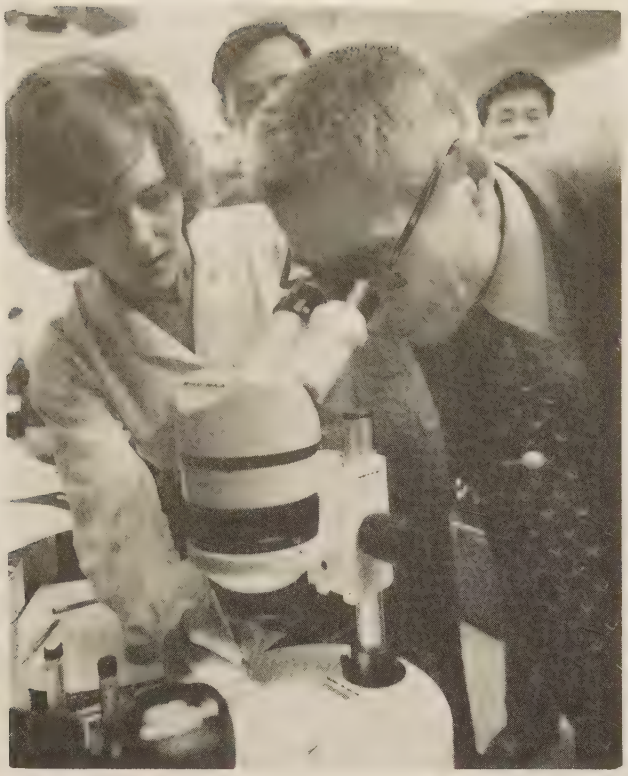
The visit of the scientists was sponsored by the National Oceanic and Atmospheric Adminstration. The purpose of the visit, according to a spokesman for NOAA, was as, "part of a cooperative effort in which representatives of both the U.S. and PRC are examining one another's facilities and technology with the goal of transfer of information and procedures, and eventual mutual coordination where possible."

While at the Center the visitors were served tea and light refreshments at an informal gathering in the auditorium. Director Barrett, Dr. Sakagawa and Dr. P. Smith presented accounts of research in progress at the Center and the group was later led on a tour of the Center's laboratories.

The group was escorted by Captain Richard Alderman of NOAA and by Dr. Ferris Webster, Assistant Administrator for Research and Development of NOAA. Although the party was accompanied by an interpreter, Dr. Nancy Lo of the Center and Dr. Lana Cheng of the Scripps Institution of Oceanography assisted in interpreting for the delegation during their visit here.

Although the delegation was at the Center only a few hours, their visit to the San Diego area continued through December 2 with visits to the Scripps Institution of Oceanography, Van Camp cannery, trip to Disneyland and Sea World and several private dinners.

The PRC delegation was led by Luo Yuru, Deputy Director of the National Bureau of Oceanography in Beijin, China and included Zou Jingmeng, Deputy Director of the Central Meteorological Bureau, Beijing, Li Changru, Member, National Bureau of Oceanography, Beijing, Wu Yikang, Division Chief, Bureau of Foreign Affairs, State Scientific and Technological Commission, Zheng Shouyi, Associate Research Fellow, Institute of Oceanography, Academia Sinica. (Mme. Zheng was the only woman in the delegation. An expert on foraminifera, she spoke excellent English); Lu Hong, Deputy Division Chief of Marine Fishery Department, General Administration of Aquatic Products, Chen Shaoxun, Engineer of Zhan Jiang Fishing Corporation, General Administration of Aquatic Products, Lu Shouben, Engineer and Deputy Division Chief of the Department of Science and Technology, National Bureau of Oceanography; Niu Yinyi, Assistant Research Fellow, Institute of Marine Scientific and Technological Information, National Bureau of Oceanography, Gao QinQuan, Secretary of Foreign Affairs, National Bureau of Oceanography; and Mei JingSheng, Interpreter, National Bureau of Oceanography.



Luo Yuru, Deputy Director of China's National Bureau of Oceanography, peers into a telescope at the National Marine Fisheries Center in La Jolla. The Chinese are showing renewed interest in the sea, with plans to establish nine institutions of oceanography.

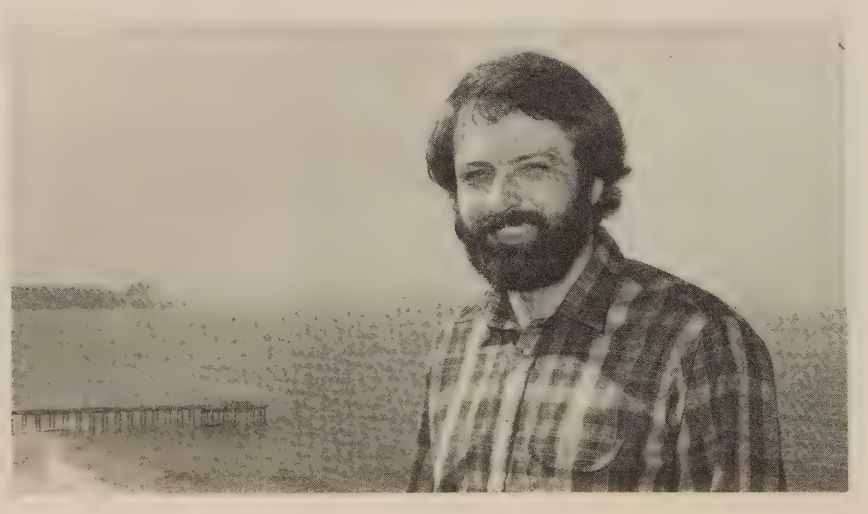
At left is the Center's Susan D'Vincent.

Michigan Congressman Visits Southwest Fisheries Center

Congressman David E. Bonior, 35 (D), representing the 12th District of Michigan, a member of the House Subcommittee for Fisheries and Wildlife and Oceanography, briefly visited the Southwest Fisheries Center and the Scripps Institution of Oceanography on November 19.

As part of his trip to the West Coast, Bonior also planned to inspect an estuarine sanctuary in Monterey and to meet with members of the California Coastal Commission in San Francisco.

At the Southwest Fisheries Center, Bonior talked with Director Barrett, toured the facilities, and met with D. Mackett, R. Lasker and W. Perrin.



November 2 - Natalie Goodall and Ian Cameron, Tierra del Fuego, Argentina visited the Marine Mammal Biology Group to observe their dissections on marine mammals and to see how data are treated. The two operate a small marine station under the auspices of the National Geographic and the Argentine government at Tierra del Fuego.

5-6 - Christine Hollowood-Schmiz, Manager, TV/Film Production, Consumer Products Group and Tom Hurley of Ralston Purina. Hollowood-Schmiz and Hurley were here to discuss their plans for a film on the tuna fishery.

11-23 - Russell Porter, Pacific Marine Fisheries Commission.

15 - Graham Mathes, Chief, Contracting and Procurement Office of NASO, Seattle was at the Center to discuss new cooperative agreements with the Director and his senior staff.

16 - Tom and Judith Rapher, University of Wisconsin, Department of Genetics, Madison, Wisconsin.

27-28 - Nancy Wiley of the Tiburon Laboratory and Fletcher Riggs of the Honolulu Laboratory were at the Center for various meetings and consultation on data management problems.

29 - Gunter Seckel, Director of PEG, here for discussions and consultation with Director and staff at Center.

- Captain John D. Stachelaus, new commanding officer of the NOAA research vessel, Townsend Cromwell.

Pacific Environmental Group

November 16 - Dr. Chris Mooers, Chairman, Oceanography Dept., Naval Postgraduate School, Monterey, CA.

19 - Mr. Larry Breaker, NOAA, NESS, Redwood City, CA.

Tiburon Laboratory

November 5 - Al Brown, California Department of Water Resources, Sacramento, CA.

- Dan Odenweller, California Department of Fish and Game, Stockton, CA.

13 - Kirk McAfee, Westmont College, Atherton, CA.

- Robert K. McAfee, H.P. Anderson and Company, Alameda, CA.

21 - Ronald L. Church, California Regional Water Quality Control Board, Santa Rosa, CA.

27 - Jean Bankhead, NOAA-ERL, Boulder, CO.

- Carolyn P. Brown, NOAA, EDIS, LISD, Rockville, MD.

- Judith Brownlow, NMFS, NOAA, Woods Hole, MA.

- Barbara Carrick, NOAA-ERL-GLERL, Ann Arbor, MI.

- Patricia Cook, NWAFC, Seattle, WA.

- Susan Covey, NOAA-NMFS-Southwest Fisheries Center, La Jolla, CA.

- R. Chris Fee, Terminal Island, CA.

- Ruth A. Green, ATOL-NOAA, Oak Ridge, TN.

- Paula Johnson, Northwest and Alaska Fisheries Center, NMFS, NOAA, Auke Bay, AK.

- Jonnie Ladner, Southeast Fisheries Center, NMFS, NOAA, Pascagoula, MS.

- Joan Maier, Chief, Library Services, NOAA, Boulder, CO

- Richard H. Meyer, National Ocean Survey, Seattle, WA.

- Jack McCormick, Chief, NMFS Scientific Publications Office, Seattle, Wa.

- Hazel Nishimura, NMFS, Southwest Fisheries Center, Honolulu, HI.

- Sherry Pearson, National Marine Mammal Laboratory, Seattle, WA.

- Linda D. Preston, National Climatic Center, Asheville, NC.

- Frances F. Swim, Library and Information Services Division, Rockville, MD.

- Robert N. Ting, NOAA, Miami, FL.

- Lois F. Winemiller, NMFS, Southeast Fisheries Center, Charleston, SC.

- Elizabeth J. Yeates, Chief, Library and Information Services Division, NOAA, Rockville, MD.

29 - Ronald L. Church, California Regional Water Quality Control Board, Santa Rosa, CA.

- D.J. Lovelady, NOAA, NASO, Seattle, WA.

- Ben Remington, NMFS, Southwest Fisheries Center, La Jolla, CA.

- Eddie Tate, NOAA, Seattle, WA.

30 - Marvin Jung, State Water Resources Control Board, Sacramento, CA.

- Dr. Frederick Weiss, Shell Development Company, Houston, TX.

MEETINGS AND TRAVEL

Honolulu Laboratory

November 1 - Drs. Michael Adams, Roy Mendelssohn, and Jeffrey Polovina and Howard Yoshida attended a meeting of the Spiny Lobster Plan Development Team called by Chairman Henry Sakuda, Hawaii Division of Fish and Game.

5 - Richard Shomura met with Dr. R. Burgner, University of Washington, and Dr. Philip Helfrich, University of Hawaii, to discuss the research being conducted by Stephen Ralston, a University of Washington Ph.D. candidate who is working on several species of bottom fishes found in the NWHI.

7 - Richard Uchida, James Uchiyama, and Bernard Ito attended a Red Snapper, Lutjanus kasmira, Workshop, sponsored by Sea Grant, University of Hawaii.

8 - Shomura attended the dedication ceremony of the Finfish Hatchery at the Oceanic Institute, Waimanalo, Hawaii.

9 - Shomura attended a Sea Grant meeting at the University of Hawaii campus to discuss Sea Grant Proposals for Year 13.

14 - Shomura attended a breakfast-meeting at the University of Hawaii campus, called by Dr. John Craven to discuss plans for hosting a group of scientists from the Peoples Republic of China.

- Shomura and Uchida attended a meeting called by Dr. Rick Grigg, Hawaii Institute of Marine Biology, in the Honolulu Laboratory Seminar Room to discuss plans for a symposium on "Tripartite and Sea Grant Studies of the Northwestern Hawaiian Islands Resources," scheduled to be held at the East-West Center, April 24-25, 1980.

- Brian and Patti Johnson met with Shomura to discuss their monk seal work.

15 - Dr. John Harville, Executive Director, Pacific Marine Fisheries Commission, Portland, Oregon, and Doyle Gates, Western Pacific Program Office, met with Shomura. Harville was interested in obtaining background information on fishery resources of the central and western Pacific. Shomura provided Harville with several relevant fishery reports.

- Uchida, in lieu of Shomura, attended the Western Pacific Regional Fishery Management Council's (WPRFMC) bottom fish meeting.

- Shomura met with Cdr. Edward Gelb of the Townsend Cromwell to discuss ship operation-related matters. Cdr. Gelb is scheduled to end his tour of duty as Commanding Officer of the Cromwell in December.

- Shomura attended a ciguatera meeting held in the Hawaii State Board of Health Board Room.

16 - Yoshida, in lieu of Shomura, attended a conference on Research and Development in Hawaii at the Ilikai Hotel, Honolulu.

19 - Shomura, Heeny Yuen, and Drs. Mendelssohn and Jerry Wetherall attended the WPRFMC Billfish Advisory and Planning Team meeting in the Honolulu Laboratory Conference Room.

20 - Dr. Leighton Taylor, Director, Honolulu Aquarium, met over lunch with Shomura and Dr. Dizon to discuss plans relating to the Kewalo Research Facility.

21 - John Marr, Executive Director, WPRFMC, had a luncheon meeting with Shomura to discuss WPRFMC/Scientific and Statistical Committee (SSC) matters.

25-30 - Hazel Nishimura, Librarian, attended the Federal Interagency Field Librarians' Workshop in San Francisco, California.

26 - Center Director Izadore Barrett spoke at a general staff meeting and also presented length of service pins to two Honolulu Laboratory employees.

26-29 - Fletcher Riggs attended the Center Data Management and Tuna Data Management Committee meetings at SWFC, La Jolla.

- Drs. Andrew Dizon and Wetherall attended the North Pacific Albacore Fishery Environment Model Project Planning meeting at SWFC, La Jolla.

27-29 - Shomura and Dr. Mendelssohn attended the WPRFMC/SSC meeting in Kihei, Maui. Shomura presented a report on his recent visit to the Cook Islands at the WPRFMC meeting.

La Jolla Laboratory

October 20 - November 5 - D. Butler traveled to Kailua-Kona to conduct radio tracking experiments on Hawaiian spinner dolphins.

October 20 - November 20 - Biological Technicians T. Shay and D. Fellbaum were in Kailua-Kona, Hawaii to conduct radio tracking experiments on Hawaii spinner dolphins.

October 29 - November 1 - Drs. G. Sakagawa and W. Parks were in Washington, D.C. to attend pre-ICCAT meeting.

October 31 - November 1 - Director Barrett was in Washington, D.C. to discuss proposed 1980 tuna/porpoise regulations.

November 1-2 - F. Kellenberger traveled to Portland, Oregon to attend the Pacific Marine Fisheries Commission Data Goals Committee meeting.

5-7 - Director Barrett in Boise, Idaho to attend the meeting of the Pacific Fishery Council's Statistical and Scientific Committee meeting of which he is a member.

6-7 - Dr. D. Huppert was in Boise, Idaho to attend the Pacific Fishery Management Council meeting on amendment to the anchovy fishery management plan.

9-12 - Dr. A. Myrick traveled to Honolulu to inspect dolphins and facilities preparatory to implementing an age determination project using Hawaiian spinner dolphins and to meet and discuss details with staff of Sea Life Park.

11-25 - J. Jennings and R. Stives were in Kona, Hawaii to conduct experiments with satellite-linked transmitters on wild Hawaiian spotter dolphins.

25-28 - Barrett was in Maui, Hawaii to attend the Western Pacific Council's Scientific and Statistical Committee meeting.

25-30 - Susan Covey was in San Francisco to attend a Federal Interagency Field Librarian's Workshop.

26-29 - Dr. R. Lasker was in Washington, D.C. to attend the National Science Foundation Executive Committee meeting.

26-30 - David Mackett traveled to Washington, D.C. to attend the FY 1982 Program Planning meetings.

NOAA-Regional Attorneys Hold Meeting at the Southwest Fisheries Center

Chaired by NOAA General Counsel Eldon V.C. Greenberg, the NOAA Regional Attorneys held their RAM-V meeting at the Southwest Fisheries Center November 18 through 20. Martin Hochman, the Southwest RegionalCounsel, was in charge of local arrangements.

Shown at the Center from left to right: Front Row: James W. Brennan, Deputy General Counsel, Gloucester, Maine; John H. Dunnigan, Regional Counsel, Gloucester, Maine; Martin H. Belsky, Office of General Counsel, Washington, D.C.; Michael E. Shapiro, Office of General Counsel, Regional Counsel, St. Petersburg, Florida; Roberto Moreno, Office of General Counsel, Regional Counsel, St. Petersburg, Florida; and Patrick J. Travers, Office of General Counsel, Juneau, Alaska.

Back Row: Martin B. Hochman; Office of General Counsel, Regional Counsel, Terminal Island, California; Eileen M. Cooney, Office of General Counsel, Regional Counsel, Terminal Island, California; Douglas Ancona, Office of General Counsel, Regional Counsel, Seattle, Washington; James K. (Kim) White, Office of Asst. General Counsel, Research and Services, Washington, D.C.; Jay S. Johnson, Office of Assistant General Counsel, Fisheries, Washington, D.C.; Michael A. Leavitt, General Counsel, Enforcement and Litigation, Washington, D.C.; Stephen J. Powell, Assistant General Counsel, Enforcement and Litigation, Washington, D.C.; and Eldon V.C. Greenberg, General Counsel, Washington, D.C.

Pacific Environmental Group

November 4-7 - Andrew Bakun traveled to Boston, MA to participate in the American Meterological Society Workshop.

13-14 - Dr. Richard Parrish traveled to Los Banos, CA, to attend a workshop to explore the analyses of data compiled by the Dungeness crab research program.

26-29 - Dr. Richard Parrish and Gunter Seckel traveled to La Jolla, CA., to attend the Tuna Environmental Workshop.

Tiburon Laboratory

October 31 - Roger Green presented results of progress in his program during the past year at the Research Council Meeting held at the Tiburon Laboratory.

November 1 - Ed Ueber attended a meeting on sable fish with members of the University of California, Santa Cruz, and California Department of Fish and Game at the Marine Science Laboratory in Santa Cruz.

9-10 - Roger Green attended the Third Annual Smoltification meeting at the University of California, Berkeley.

19-21 - Norman J. Abramson and Sus Kato traveled to Fort Bragg and Albion, California, to meet with fishermen, processors, and personnel of California Department of Fish and Game. Kato showed slides of the sea urchin industries in California and Japan to a group of about 20 divers and processors. Slides of Kato's recent trip to Japan were also viewed by a fish processor and several fishermen.

27 - Dan Ralph attended the monthly meeting of the San Francisco Tyee Club and presented results of this year's salmon rearing.

- Twenty-four librarians met at the Tiburon Laboratory. They were attending the Federal Inter-Agency Field Librarians' Workshop which was being held in San Francisco. There were representatives from various facilities of the National Marine Fisheries Service, Environmental Research Laboratory, National Ocean Survey, and NOAA Headquarters. The meeting began with a tour of the laboratory and descriptions of

current research projects. Then, Nina Hirsch guided the librarians on an indepth tour of the Physiology Laboratory. Presentations given at the meeting included the following topics and features speakers:

(1) Alternative Forms of Federal Employment - Chris Fee, Area Personnel Officer, NASO, NOAA, Terminal Island, CA.

(2) NOAA Automated Library and Information System, Update - Elizabeth Yeates, Chief, Library and Information Services Division, NOAA, Rockville, MD.

(3) Do Library Managers Have More fun than Librarians? Viewpoint of Becoming Part of the Management Team: Jack McCormick, Chief, NMFS Scientific Publications Office, Seattle, WA.

(4) A Federal Library Network Prototype Project (Slow Scan Television and Facsimile) Update: Joan Maier, Chief, LibraryServices, NOAA, Boulder, Colorado.

(5) Personal Account of Appeal for Field Librarians' Grade Change: Maureen Woods, Librarian, Tiburon Laboratory.

27-30 - Ed Ueber chaired the meetings of the Pacific Fishery Management Council's Groundfish Plan Development Team at the Northwest and Alaska Fisheries Center, Seattle, Washington. The purpose of the meeting was to set up monitoring units for different species and species groups as outlined in the draft Groundfish Plan. Dr. William H. Lenarz also attended the meetings.

28-29 - Ed Ueber attended the Northwest and Alaska Fisheries Center's Groundfish Assessment Planning Meeting in Seattle, Washington. At this meeting, Ueber presented the needs and priorities of the Pacific Fishery Management Council's Groundfish Plan Development Team. Tony Chess also attended the meeting for the Fish Communities Task (Predator/Prey), and Dr. Lenarz presented an evaluation on shortbelly rockfish.

29 - A Sewage Treatment meeting was held at the Tiburon Laboratory, to discuss options presented in the Brelje and Race, Inc. study and determine which one to select for contract. San Francisco State University also requested additional information for Buildings 39 and 53 not included in the original study. Attendees included: Leroy Carlenzoli, Brelje and Race, Inc., Santa Rosa; Eddie Tate, Facilities Engineer, NOAA

Project Officer; D.J. Lovelady, Contracting Officer, NASO; Ben Remington, Executive Officer, Southwest Fisheries Center, La Jolla; and the following San Francisco State University members: Dr. Konnilyn Feig, Vice President for Administration; Morgan Griffiths, Plant Engineer; and Dave Taylor, Plant Manager. Norman J. Abramson and Walburga Giguere, Tiburon Laboratory, also attended the meeting.

PERSONNEL

Honolulu Laboratory

November 4 - Laura M. Duffy, Biological Aid (Fisheries) - Intermittent.

9 - Christine E. Siu, Biological Aid (Microbiology) - Completion of 700-hour Appointment.

16 - Sharon D. Hendrix, Biological Aid (Fisheries) - Completion of 700-hour Appointment.

30 - Maria S. Wallace, Time and Leave Clerk (Typing) - Resignation.

La Jolla Laboratory

November 4 - Tim Smith, Supervisory Fishery Biologist - Promotion.

19 - Robert Butler, Computer Programmer - Return to Duty.

Tiburon Laboratory

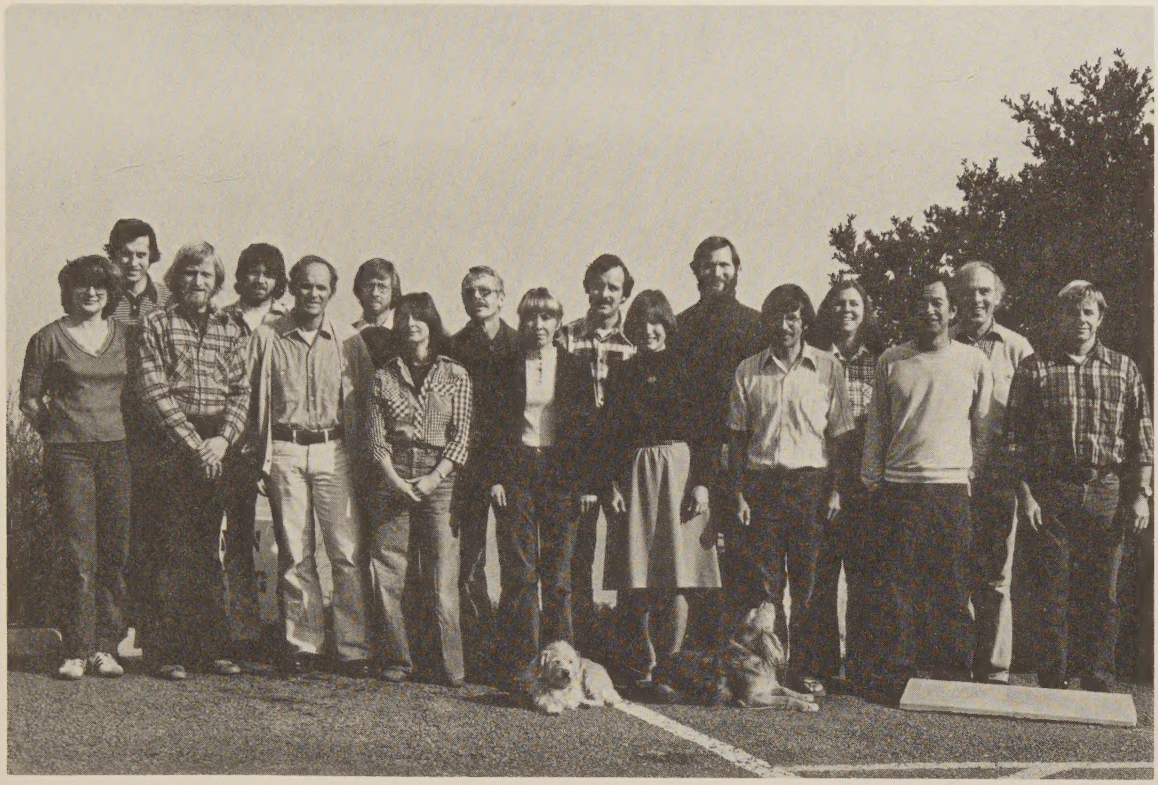
November 4 - Candis Cooperrider, Biological Technician - 700-hour Appointment.

19 - Dennis Nakazono, Biological Aid - 130-Day Appointment.

- Kimberly Dietrich, Clerk-Stenographer - Temporary Appointment.

- Marguerite S. Ryan, Clerk-Stenographer - Extension of 30-Day Appointment.

Professional Staff of the
Tiburon Laboratory



Pictured left to right: Fishery Biologist Jeannette Whipple; Research Chemist Pete Benville; Biological Technicians Brian Jarvis and Mike Bowers; Fishery Biologists Ted Hobson, Dan Ralph, Tina Echeverria, Roger Green and Susan Smith; NOAA Corps Officer Pat Rutten; Librarian Maureen Woods; Fishery Biologists Pete Adams and Bill Lenarz; Computer Specialist Nancy Wiley; and Fishery Biologists Susumu Kato, Norm Abramson and Tony Chess. Absent from picture are Fishery Biologist Mickey Eldridge and Economist Ed Ueber.

UNITED STATES
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